

REMARKS

These amendments and remarks are filed in response to the final Office Action mailed June 6, 2008. For the following reasons, this application should be allowed and the application passed to issue. No new matter is introduced by this amendment. The amendment to claim 6 further clarifies the claim and is supported by page 8, lines 14-22, Example 35, and Table 5 of the present specification. Claim 1 and Example 40 support the amendment to claim 8.

Claims 1-4 and 6-9 are pending in this application. Claims 1-4 and 6-9 have been rejected. Claims 6 and 8 are amended in this response. Claims 5 and 10-12 were previously canceled.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-4 and 6-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tarui et al. (JP 2003/077529) in view of Yamamoto et al. (US 2003/0054249). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as filed, and the cited prior art.

The Examiner asserted that Tarui et al. disclose a lithium secondary battery using a negative electrode active material comprising an alloy mainly containing Si and an element selected from the group consisting of Ti, Co, Mg, Zr, V, Mo, W, Mn, and Fe. The Examiner acknowledged that Tarui et al. do not disclose the surface layer comprising silicon oxide. The Examiner relied on Yamamoto et al. to teach the claimed silicon oxide surface layer and asserted that it would have been obvious to combine Yamamoto et al. with Tarui et al. in order to reduce anode potential during discharging and to reduce HF acid level in the electrolyte. In the Response to Arguments section, the Examiner maintained that Yamamoto et al. teach improved discharge capacity in Table 4, therefore, the arguments of unexpected results was not persuasive.

The combination of Tarui et al. and Yamamoto et al. do not suggest the negative electrode active materials for a non-aqueous electrolyte rechargeable battery, as required by claims 1, 6, and 8, and the non-aqueous electrolyte rechargeable battery according to claim 9 because the combination of references do not suggest the unexpected results obtained by the present invention and there is no motivation to combine the references as asserted by the Examiner.

Yamamoto et al. teach that by providing a surface oxide layer the LiF formation on the negative electrode surface is suppressed and the resistance becomes smaller (see paragraph [0093]). In addition, Yamamoto et al. describe that when a silicon oxide layer is provided on the active material layer surface, the initial capacity increases (see Example 4). Tarui et al. teach that in a battery mixture comprising a solid electrolyte, a first mixture layer comprising Si (Si alloy or amorphous Si) an electrolyte component is formed on the Si material layer surface, so as to improve contact between the Si material layer and the solid electrolyte. Tarui et al. also describe discharge characteristics improve by providing the first mixture layer.

According to the Office Action, modifying the battery of Tarui et al. to provide the surface layer of oxide layer of Yamamoto et al. on the surface of the Si material of Tarui et al. would have been obvious. However, the active material of Tarui et al. comprises a Si material layer and a first mixture layer formed on the surface of the Si material layer. Therefore, if the oxide layer of Yamamoto et al. is provided on the surface of the active material layer of Tarui et al. (the first mixture layer), the effect achieved by the first mixture layer will be lost. Thus, there would be no motivation to provide the oxide layer of Yamamoto et al. on the surface of the active material of Tarui et al. because doing so would result in eliminating the beneficial effects achieved by Tarui et al. If a proposed modification would render the prior art invention being

modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984); MPEP § 2143.01.

Furthermore, Tarui et al. do not describe an active material comprising a Si phase and a Si alloy phase, as in claim 6. Table 5 of the present specification shows that Battery A35, which includes a Si phase and a TiSi_2 phase, has a larger discharge capacity (C1-C4) as well as improved cycle life characteristics (P) compared to Battery A37, which includes only the TiSi_2 phase. Tarui et al. do not suggest the effect achieved by an alloy comprising the above two phases.

The cited references do not suggest improving the capacity of an electrode wherein the active material is mainly composed of silicon, as required by claims 1, 6, 8, and 9. Yamamoto et al. do not suggest that the silicon oxide layer surface layer would improve the discharge capacity of a negative electrode composed of mainly silicon after five charge/discharge cycles followed by high temperature storage at 80 °C (condition C4) as in the present invention (see Tables 3 and 8 of the present specification). Note that the batteries according to the present invention have an unexpectedly improved combination of discharge capacity under condition C4, Q value, and internal resistance compared to the Comparative Examples. In particular, note the improved characteristics of Batteries A35 (corresponding to claim 6) and A40 (claim 8).

Obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); *In re Fine*, F.2d 1071, 5

USPQ2d 1596 (Fed. Cir. 1988). There is no suggestion in Tarui et al. and Yamamoto et al. to substitute a negative electrode active material mainly composed of Si, and an inner layer comprises an alloy comprising Si and at least an element selected from the group consisting of Ti, Co, Mg, Zr, V, Mo, W, Mn and Fe in the battery of Tarui et al., as required by claims 1 and 9; an inner layer comprising a Si phase and an alloy phase containing Si and at least an element selected from the group consisting of Ti, Co, Mg, Zr, V, Mo, W, Mn and Fe in the battery of Tarui et al., as required by claim 6; and an inner layer comprising an amorphous Si phase in the battery of Tarui et al., as required by claim 8, nor does common sense dictate such a modification. The PTO has not provided any evidence that there would be any obvious benefit in making such a modification of Tarui et al. *See KSR Intl Co. v. Teleflex, Inc.*, 500 U.S. ____ (No. 04-1350, April 30, 2007) at 20.

The only teaching of the claimed negative electrode active material and non-aqueous electrolyte rechargeable batteries is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The dependent claims are allowable for at least the same reasons as the respective independent claims from which they depend, and further distinguish the claimed positive electrode current collector.

In view of the above remarks, Applicants submit that this case should be allowed and passed to issue. If there are any questions regarding this response or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

Application No.: 10/816,221

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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